Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

the intensity of magnetization of the investigated specimen can be calculated from formula (1) given at the bottom of p 514, where: C_b - a ballistic galvanometer constant for a given value of the resistance r; n_2 - number of turns in the measuring coils connected in series and magnetically opposed; I_s, - intensity of magnetization of the standard specimen. The standard specimens were made of steels Kh12M and Kh12F1, quenched from 1125 and 1140°C, respectively, subjected to a sub-zero treatment and tempered several (up to ten) times at 530 to 650°C, each tempering treatment being followed by supplementary cooling to -195°C. It was considered that no austenite was present in specimens heat treated in this manner and the proportion of retained austenite in the experimental specimens was calculated from formula (2) given at the top of p 515. The mean values of hardness (Rockwell, scale B), H_C, μ_{max}, I_S and ρ, of the investigated steels in the starting condition (i.e. consisting of fine-grained perlite with more or less uniform distribution of

Card 3/12

carbides) are given in Table 2. The effect of the quenching temperature on the investigated properties of steel Kh12F1 quenched in air and in oil is illustrated in Fig 2a and 2b, respectively, the numbered graphs corresponding to specimens subjected to following treatment: 1 - quenched only; 2 - quenched and tempered at 520°C; 3 - quenched and tempered twice at 520°C (second time for 2 hours). The effect of the quenching temperature on the properties of steel Kh12M quenched in air is illustrated in the same manner in Fig 3. The results of these experiments showed that only the magnetic properties can be used to check whether the correct quenching temperature has been used for a given article. It is pointed out, however, that the magnetic properties of a treated article are affected by even a slight degree of decarburization, as has been shown by the experiments the results of which are reproduced in Fig 4 and 5. Fig 4 shows the relationship between the quenching temperature (°C) and the coercive

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

force H_C, of specimens of the Kh12M steel quenched in air. Graphs 1 and 2 show the variation of H_C of specimens unprocected from decarburization from which a surface layer 0.1 and 1.0 mm thick respectively, were ground off; graph 3 refers to a chromium-plated specimen from which a 1.0 mm thick surface layer was removed after the heat treatment. The effect of the presence of a decarburized surface layer on H_C of steel characterized by low I_S (steel Kh12M) is even better illustrated in Fig 5. Here, strips of transformer steel of various thickness attached closely to the faces of the experimental specimens were used to simulate the decarburized surface layers and Fig 5 shows how the values of H_C and I_S varied with varying thickness of these super-imposed strips. Graphs 1 and 2 were plotted for quenched specimens, graphs 3 and 4 for specimens quenched and tempered at 600°C (quenching temperature: 1200°C). The effect of the quenching temperature on various properties of steel Kh12F1 quenched

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

in oil is illustrated in Fig 6, where graphs are plotted for specimens in the following conditions: 1 - quenched; 2 - quenched and cooled to -195°C; 3 - quenched, cooled to -195°C and tempered for 2 hours at 520°C; 4 - as in (3) but the tempering treatment repeated. Graphs reproduced in Fig 7 show: (1) - the decrease in the proportion of the retained austenite (ΔA), and (2) - the linear contraction of the experimental specimens (ΔL), brought about by cooling them to the temperature of liquid nitrogen, as functions of the quenching temperature. The relationship between the properties of steel Kh12F1 oil-quenched from 1050°C and the tempering temperature (duration of the tempering treatment - 1 hour) is shown in Fig 8. The characteristics of steel Kh12M quenched in air from 1025°C and tempered at various temperatures for 1 hour (once and twice) are given in Table 3, where the first column gives the tempering temperatures employed, the next seven columns give the properties of the steel after

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

the first tempering treatment (the figures in the top row representing the properties of the steel in the as-quenched condition) while the last 8 columns give the properties of the steel after the second tempering treatment. The properties of steel Kh12M air-quenched from 1125°C and tempered once, twice and 3 times at various temperatures (each tempering treatment lasting 1 hour) are given in Table 4 set out in the same manner as Table 3. The relationship between the properties of steel Kh12F1 oil-quenched from 1140°C and the tempering temperature is shown in Fig 9 for specimens tempered (1) once and (2) 3 times, each tempering treatment lasting 1 hour. The effect of the duration (hours) of the tempering treatment on the properties of steel Kh12F1 oil-quenched from 1140°C is shown in Fig 10, curves 1, 2 and 3 corresponding to specimens tempered at 530, 550 and 600°C respectively. The relationship between the properties of steel Kh12F1 oil-quenched from 1140°C and the number of the tempering treatments carried out at 530°C is shown in Fig 11, curves 1 to 5

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

corresponding to specimens held at the tempering temperature for 15, 30, 60, 120 and 240 minutes, respectively. The same relationship for steel Kh12F1 oil-quenched from 1140°C and tempered at 550 and 600°C is shown in Fig 12 a and b, respectively. In the last series the effect of the heat treatment procedure on the degree of stabilization of the retained austenite was studied. The effect of the quenching temperature on the properties of steel Kh12F1 quenched in oil and then subjected to sub-zero treatment immediately after quenching (circles) and after 6 days at room temperature (dots) is shown in Fig 13. The effect of time (at room temperature) elapsed between the quenching operation and the tempering treatment on the stabilization of the retained austenite and on various properties of steel Kh12F1 is illustrated by the data reproduced in Table 5. The properties of the specimens immediately after quenching (in oil) from 1140°C are listed in the second column; figures in the third column show how

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

long the quenched specimens were held at 20°C prior to the tempering treatment (5 min, 3 hours and 50 hours); the properties of specimens tempered at 550°C 1, 2, 3 and 4 times (each treatment of 1 hour duration) are listed in columns 4, 5, 6 and 7 respectively. The experimental results reported in the present paper are correlated with those obtained by other workers and several conclusions are drawn. (1) There is a wide range of both quenching and tempering temperatures that can be employed in the thermal treatment of steels Kh12M and Kh12F1; the choice will depend on the properties required in any given application. The quenching temperature, however, should not exceed 1175 - 1185°C: the application of higher temperatures results in excessive grain growth and grain-boundary precipitation of non-metallic impurities and carbides formed during subsequent cooling which affect adversely the mechanical properties of the heat-treated article. Since the high chromium content steels are very sensitive to decarburization, appropriate precautions should be taken.

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

(2) The initial hardness is best obtained in steels Kh12M and Kh12F1 by quenching them in oil or air from 1020 - 1040 and 1025 - 1050°C respectively and tempering for 2 hours at 150-200°C. No transformation of the retained austenite takes place during tempering at temperatures below 450-500°C. Even after tempering at high temperatures, hardness of the steels under consideration remains comparatively high: it is higher than 61 (Rockwell, scale C) after tempering at 200°C and higher than 59 after tempering at 450-500°C, the hardness value of the quenched specimens being of the order of 64. (3) When heat treating for the secondary hardness, quenching temperatures of 1100 to 1175°C are recommended. The tempering treatment should be carried out at 520 to 550°C; this should produce hardness of 60 to 61 Rockwell (scale C). When best mechanical properties are aimed at, it is advisable to replace one long tempering treatment by several of shorter duration; such a procedure assists in securing the complete

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

decomposition of the retained austenite and in obtaining the highest value of the secondary hardness. When this heat treating technique is employed, check measurements of the mechanical properties and determination of the proportion of the retained austenite by means of magnetic measurements should be carried out after each tempering cycle. The number of the tempering cycles can be reduced by means of a sub-zero treatment applied after quenching. (4) When quenching temperatures higher than 1125°C are employed (treatment for the secondary hardness), there is no stabilization effect; if steel is held at room temperature prior to the sub-zero or tempering treatment, only a small reduction in the proportion of the retained austenite is attained. (5) Hardness measurements cannot be used as a means of controlling the quality of the quenching operation (hardening treatment) since specimens quenched from, and tempered at, various temperatures can have the same hardness. (6) Measurements of the intensity of magnetization, I_S,

Magnetic, Electrical and Mechanical Properties of Steels with High Chromium Content After Various Heat Treatments

magnetic permeability, μ_{max}, coercive force, H_c and electrical resistivity, ρ, provide the most accurate means of controlling the quality of the thermal treatment of steels Kh12M and Kh12F1. When the measurements of the magnetic properties are used for this purpose, the best results are obtained with the aid of the differential ballistic method, the advantages of which have been already proved on other previous occasions (Ref 6, 19 and 20). There are 13 figures, 5 tables and 20 Soviet references.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet imeni A.M.Gor'kogo (A.M.Gor'kiy Ural State University)
Institut fiziki metallov AN SSSR (The Institute of Metal Physics, Academy of Sciences, USSR)

SUBMITTED: August 21, 1958

SOV/126-8-2-4/26

AUTHORS: Tomilov, G.S., Mikheyev, M.N. and Pomukhin, M.F.

TITLE: Magnetic Properties of Steels as a Basis for Magnetic Structural Analysis

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 176 - 181 (USSR)

ABSTRACT: The principles of magnetic analysis for controlling structural changes during heat treatment of steels are well known. As troostite or pearlite are formed from martensite, there is a steady decrease in the coercive strength, as in hardness. However, tempering certain steels in the temperature range 200 - 600 °C results in a steady decrease in hardness but not in magnetic properties. Two steels were therefore investigated - ShKh15 (1.0% C, 1.5% Cr, 0.3% Mn and 0.3% Si) and 40KhN (0.4% C, 0.6% Cr, 0.6% Mn, 0.25% Si, 1.10% Ni). Figure 1 shows the changes in coercive strength (H_c), magnetic saturation (I_s), hardness (R_c) and electrical resistance (ρ) for ShKh15 with temperature. With

Card1/3

Magnetic Properties of Steels as a Basis for Magnetic Structural Analysis

increase in tempering temperature R_c and ρ decrease steadily but H_c has a maximum at 500 - 525 °C. Similar curves are obtained for 40KhN (Figure 2). It is shown, however, that the observation temperature is important. If H_c is measured at a temperature greater than 220 (Curie temperature for carbides) there is a maximum H_c at a tempering temperature of about 400 °C and then a steady decrease. This confirms Kondorskiy's theory that the maximum H_c when measured at room temperature corresponding to a tempering temperature of 500 - 550 °C is caused by carbides. Thus, if measurements are carried out at 220 °C or slightly higher, good control

SOV/126-2-1/20

Magnetic Properties of Steels as a Basis for Magnetic Structural Analysis

of quality can be obtained for articles made from tempered martensite.
There are 4 figures, 1 table and 14 references, 13 of which 13 are Soviet and 1 English.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Metal Physics of the Ac.Sc., USSR)

SUBMITTED: October 13, 1956

Card 3/3

18.8100

66222

AUTHORS: Mikheyev, M.N. and Tomilov, G.S. SOV/126-8-3-5/33

TITLE: A Contribution to the Problem Regarding the Anomalous Behaviour of the Coercive Force in Quenched and High Temperature-Tempered Steels

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 3, pp 346-348 (USSR)

ABSTRACT: The present paper endeavours to explain the anomalous behaviour of the coercive force of high temperature-tempered martensitic steels on the basis of the theory developed by Kondorskiy (Ref 4). The results of measurements of the magnetic properties of many structural and high carbon tool steels, as well as the temperature dependence of the magnetic properties, agree well with data of this theory. Fig 2 of the paper by Tomilov et alii (Ref 13) gives the magnetic properties, hardness and electrical resistance at room temperature of the typical structural steel 40KhN in relation to tempering temperature. The temperature dependence of the magnetic properties is shown in Fig 4 of the above paper, from which it can be seen that at an observation temperature of more than 220°C, when all carbides are

Card 1/3

A Contribution to the Problem Regarding the Anomalous Behaviour of the Coercive Force in Quenched and High Temperature-Tempered Steels

practically paramagnetic, a maximum for the coercive force can be observed in specimens which have been tempered at approximately 320°C. In specimens which have been tempered at all temperatures above 400°C, the coercive force falls steadily and practically rectilinearly with increase in tempering temperature. The magnetization to saturation of the matrix I_m, which can be observed at 300°C, remains practically constant in the whole tempering range of 400 to 650°C (curve 6 in Fig 4 of Ref 13). However, the magnetization to saturation at room temperature (curve 1) drops sharply in the above tempering temperature range. As the quantity of the carbide phase remains practically unaltered on tempering at above 400°C, its magnetism must decrease. From a consideration of these results and Kondorskiy's theory the authors confirm the correctness of the theory, which states that the anomalous behaviour of the coercive force of quenched and high temperature-tempered steels is associated with the change in shape, magnetization to saturation and average size of the carbides. There are

Card 2/3

4

66222

SOV/126-8-3-5/33

A Contribution to the Problem Regarding the Anomalous Behaviour of the Coercive Force in Quenched and High Temperature-Tempered Steels

13 references, 3 of which are English, 1 German and 9 Soviet.

ASSOCIATION: Institut fiziki meta`lov AN SSSR (Institute of Metal Physics, AS USSR)

SUBMITTED: January 3, 1959

Card 3/3

18.1120
18.8100

67685
SOV/126-8-4-7/22

AUTHORS: Mikheyev, M.N., and Tomilov, G.S.

TITLE: Magnetic and Electrical Properties and Hardness of High-Carbon Alloyed Steels in the Hardened State

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 4, pp 543-556 (USSR)

ABSTRACT: The authors report an investigation of the magnetic properties after hardening of some industrial tool steels with the following percentage compositions:

KhV-5: 1.42 C, 0.51 Cr, 0.23 Mn, 0.25 Si, 5.2 W, 0.25 Ni;
KhG3: 0.9o C, 1.35 Cr, 2.43 Mn, 0.50 Si, < 0.02 S, < 0.03 P;
ShKh15: 1.00 C, 1.50 Cr, 0.30 Mn, 0.30 Si, < 0.02 S, < 0.03 P;
ShKh15SG: 1.06 C, 1.45 Cr, 1.07 Mn, 0.50 Si, < 0.02 S, < 0.03 P;
Kh12F1: 1.44 C, 11.60 Cr, 0.28 Mn, 0.34 S, 0.23 Ni, 0.86 V, 0.022 S, 0.018 P.

Card 1/4

The test steels were taken in the annealed state with a granular-pearlite structure tested after various heat

Magnetic and Electrical Properties and Hardness of High-Carbon Alloyed Steels in the Hardened State

treatment. In addition to the magnetic properties the hardness and, sometimes, the electrical resistivity, were tested. The results are plotted against tempering temperature in Figs 1-6. Fig 7 shows the coercive force and quantity of residual austenite after hardening granular and lamellar pearlite of ShKh15SG steel from different temperatures in oil at room temperature. Microstructures were also studied. It was found that the course of the change of coercive force after hardening to micro-crystalline martensite reflects the degree of saturation of the solid solution by carbon and alloying elements and is therefore parallel to the course of the hardness and electrical-resistivity changes. This relation holds with increasing hardening temperature until the structure of the steel after hardening remains micro-crystalline. After complete solution of carbides overheating begins, with deterioration of mechanical properties and softening. In this stage the coercive force of martensite-class steels decreases, while that of austenite-class steels,

Magnetic and Electrical Properties and Hardness of High-Carbon Alloyed Steels in the Hardened State

containing little martensite after hardening, rises sharply. The behaviour of coercive force and magnetization in the hardening of specimens with very different initial structures points to a correlation between magnetic properties and grain size of steel, confirming the method previously proposed by the authors (with K.G. Rzyankin and V.A. Utkina) for checking the quality of hardening under production conditions (Ref 22). With hardening temperatures above 950 °C, even with heating in a periodically deoxidized fused barium-chloride bath, surface impoverishment occurs, giving a relatively hard surface while the saturation magnetization and coercive force increase with increasing hardening temperature; these effects do not arise if reaction between specimen and liquid is avoided or if the impoverishment layer is ground off.

There are 7 figures, 3 tables and 22 references, of which 19 are Soviet, 1 is English, 1 is German and 1 in Acta Metallurgica.

67685

SOV/126-8-4-7/22

Magnetic and Electrical Properties and Hardness of High-Carbon Alloyed Steels in the Hardened State

ASSOCIATION: Institut fiziki metallov AN SSSR
(Institute of Physics of Metals, Ac. Sc. USSR)

SUBMITTED: February 3, 1959

Card 4/4

25(6) SOV/32-25-4-28/71

AUTHORS: Tomilov, G. S., Mikheyev, M. N., Pomukhin, M. F., Utkina, V. A.

TITLE: Magnetic Method for the Quality Control of the Thermal Treatment of Bearing Parts (Magnitnyy metod kontrolya kachestva termicheskoy obrabotki podshipnikovykh detaley)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 4, pp 448-453 (USSR)

ABSTRACT: The influence of the primary structure of bearing parts (made of steel ShKh 15) on the magnetic properties, the structure and hardness after hardening, was tested. Steel rolls (diameter = 23 mm, height = 20 mm) and samples with the dimensions 10 x 10 x 65 mm were used for the tests. By different preliminary treatment (Table) 4 groups of primary structures were obtained-from the heterogeneous coarse-grained perlite to the laminar perlite. The electric diagram of the device for determining the coercive force and for magnetizing ball and roller bearings (Fig 1), as well as the diagrams of the correlation between hardness and coercive force of the steel ShKh 15 in the primary state (Fig 2), and the coercive force after oil hardening at different temperatures (Fig 3) (for the two types of structure mentioned above), as well as a schematic representation (Fig 4) on the possibility of separating the good products from the

Card 1/3

Magnetic Method for the Quality Control of the Thermal Treatment of Bearing Parts

scrap after hardening, are given. In connection with the latter, a diagram of comparison between the coercive force and quality of residual austenite in the sample rolls, on one hand, and the microstructure and hardness after hardening, on the other, is shown (Fig 5). The test results show that even a 100% quality control of the hardening for hardness or coercive force approves a wide range of the primary structure "as good products". The most reliable quality control of hardening by the magnetic method can only be attained by a simultaneous determination of the saturation magnetization and the coercive force. The greatest effect of the continuous tests with magnetic differential devices for the quality control of hardening by the method of two magnetic characteristics can be expected by an automation of the process of thermal treatment and of the controlling method. The fact - not very important for industry - that at a hardening temperature above 950° and a prolonged hardening time a great increase in magnetization arises, is due to an impoverishment in carbon (Fig 6). The described method can also be applied to other types of steel, rich in carbon, the magnetic and mechanical properties of which vary with the hardening temperature and dis-

Magnetic Method for the Quality Control of the Thermal Treatment of Bearing Parts

persion of the primary structure, in analogy with the steel ShKh 15. There are 6 figures, 1 table, and 2 Soviet references.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR i Sverdlovskiy podshipnikovyy zavod GPZ-6 (Institute of Metal Physics of the Academy of Sciences USSR, and Sverdlovsk Factory of Bearings GPZ-6)

81908

S/126/60/010/01/013/019
B111/B335

18.7500

AUTHORS: Belenkova, M.M., Kodlubik, I.I., Malyshev, K.A., Mikheyev, M.N., Sadovskiy, V.D. and Ustyugov, P.A.

TITLE: Influence of Deformation of Martensite on the Cold Shortness of Austenitic Steels and Their Hardening in Plastic Deformation

PERIODICAL: Fizika metallov i metallovedeniye, 1960. Vol.10. No. 1, pp. 122 - 130

TEXT: Investigation of a series of austenitic steels has shown that some have a tendency to brittle fracture. The authors point out that martensite formation during cold-shortness testing is the probable cause and that liability of austenitic steels to form martensite in plastic deformation depends on the position of the deformation temperature relative to the martensite point (Ref 2) and the temperature at which austenite and martensite free energies are equal. Their present work dealt with the following steels (analysis in Table 1): 40G18, 40G18Kh4, 40G18Kh8, 40G18Kh4N4, 40G18Kh4N8, 40G18Kh4N8V, 50G18, 50G18Kh4, 50G18Kh4N8V, 50G18Kh4N4, covering the composition ranges (%): 0.40 - 0.55 C, 0-0.71 Si, 17.30-18.60 Mn, 0-8.0 Cr, 0-8.32 Ni.

Card 1/4

81908

S/126/60/010/01/013/019
E111/E335

Influence of Deformation of Martensite on the Cold Shortness of Austenitic Steels and Their Hardening in Plastic Deformation

0-0.71 W, 0-0.010 S, 0-0.067 P. 60 mm long pieces were cut from 12 x 12 mm forged bars. The pieces were heated to 1150 °C and cooled in water. Magnetometric tests showed no martensite transformation on cooling to -196 °C. Standard notched test-pieces (2 mm deep notch, 1 mm radius of curvature) were used for impact tests from room to liquid-nitrogen temperature. Alpha-phase (deformation martensite) was found with great sensitivity by measuring magnetic susceptibility (Ref 3) of austenite on 3 x 4 x 9 mm pieces cut from the fracture region of impact specimens, Mohr's salt being used as the standard. In a second series of experiments the austenitic steels after quenching from 1150 °C were rolled at 20-600 °C to give 30% deformation. Figs. 1-3 show the toughness of the various steels as functions of test temperature, the effect of the various alloying elements being brought out; magnetic susceptibility as functions of test temperature being similarly shown in Figs. 4 and 5. Figs. 6 and 7 show deformation of martensite structures and Fig. 8 the fractures obtained at various temperatures. The dependence of

Card 2/4

S/126/60/010/01/013/019
E111/E335

Influence of Deformation of Martensite on the Cold Shortness of Austenitic Steels and Their Hardening in Plastic Deformation

tensile strength, yield point, toughness and magnetic susceptibility on deformation temperature is shown in Figs. 9, 10, 11 and 12. 40G18 and 50G18 steels showed pronounced cold shortness, which could be considerably reduced or completely eliminated by additional alloying with chromium or nickel. The reason for the cold shortness is deformation-martensite formation during low-temperature impact testing. The good effect of alloying the manganese steels with chromium and nickel is explained by the increased austenite stability with respect to plastic-deformation induced martensite transformation. Formation of such martensites is the reason for the greater hardening of manganese austenitic steels in cold compared with 200-300 °C plastic deformation. In stable austenitic steels, additionally alloyed with chromium and nickel, hardening in cold and semi-hot work-hardening is practically the same. There are 12 figures, 3 tables and 5 Soviet references.

Card 3/4

81908

S/126/60/010/01/013/019
E111/E335

Influence of Deformation of Martensite on the Cold Shortness of Austenitic Steels and Their Hardening in Plastic Deformation

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals of the Ac.Sc., USSR)
Ural'skiy zavod tyazhelogo mashinostroyeniya im. S. Ordzhonikidze (Ural Heavy Engineering Works imeni S. Ordzhonikidze)

SUBMITTED: February 23, 1960

Card 4/4

4

BRAYNINA, Z.Z.; MIKHEYEV, M.N.; RUDOMANOV, P.G.; SELYAKHINA, V.P.

Studying the aging of silicon-manganese bronze by measurements of magnetic susceptibility and electric resistance. Fiz. met. i metalloved. 10 no.3:490-492 S '60. (MIRA 13:10)

1. Institut fiziki metallov AN SSSR.
(Bronze—Testing)

S/129/60/000/011/004/016
E073/E535

AUTHORS: Belenkova, M.M., Kostenko, A.V., Mikheyev, M.N., Stoinskaya, E.E., Pogrebetskaya, T.M. and Yurgenson, A.A., Engineers.

TITLE: Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, No.11, pp.16-20

TEXT: A nitrided layer of austenitic steel can be ferromagnetic, although the core of the component can remain paramagnetic. By changing the preliminary heat treatment it is possible to obtain an austenite with various degrees of alloying and various compositions of the secondary phases. Changes in the phase composition during preliminary heat treatment of austenitic steel may bring about changes in its magnetic properties due to formation of δ-ferrite resulting from quenching at elevated temperatures. For this reason, the authors considered it of interest to study the influence of preliminary heat treatment and nitriding on the mechanical properties of austenitic steel. Two steels of the following compositions were investigated: (in %)

Card 1/5

S/129/60/000/011/004/016
E073/E535

Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

Steel	C	Si	Mn	Cr	Ni	W	Ti	S	P
ЭИ123 (EI123)	0.18	2.27	0.65	14.54	13.80	1.79	0.84	0.007	0.016
1Х18Н9Т (1Kh18N9T)	0.10	0.58	0.53	17.78	8.70	-	0.64	0.013	0.020

The magnetic properties were studied after preliminary heat treatment followed by nitriding. The steel 1Kh18N9T was additionally subjected to "wrong" nitriding: tinned specimens were charged into a furnace simultaneously with the nitrided specimens of the same steel. The magnetic properties of the steel EI123 were determined after normalization annealing or after normalization annealing and ageing. The normalization temperature was 1150 and 1070°C. The preliminary heat treatment of the steel 1Kh18N9T consisted in quenching from 1150°C in water and subsequent ageing. Both steels

Card 2/5

S/129/60/000/011/004/016
E073/E535

Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

were aged for 8 hours at 800°C. The specimens were in the form of 12 mm diameter, 5 mm long cylinders. The magnetic susceptibility of the steels EI123 and 1Kh18N9T in the paramagnetic state was measured by means of magnetic scales at various field strengths so as to determine the $\chi(H)$. For investigating the magnetic properties of the nitrided steels, specimens in the form of tubes with an external diameter of 8 mm, a length of 60 mm and a wall thickness of 0.5 mm were used. The external surfaces of the specimens were ground whilst the internal surfaces were machined by means of a reamer. Prior to nitriding, the specimens were etched in a hydrochloric acid solution at 70°C for 5 min and then nitrided in a laboratory furnace at 600°C, with a holding time of 65 hours for the steel EI123 and 75 to 55 hours for the steel 1Kh18N9T. The 75 hour holding time corresponded to the maximum depth of the nitrided layer for specimens with a wall thickness of 0.5 mm. The magnetic properties of nitrided specimens were measured ballistically in an open magnetic circuit. On the basis of the obtained results, which are given, the following conclusions are arrived at:

Card 3/5

S/129/60/000/011/004/016
E073/E535

Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

1) Changing of the normalization annealing temperature of the steel EI123 from 1070 to 1150°C and additional ageing for 8 hours at 800°C does not bring about a change in the susceptibility of this steel.
2) Nitriding changes to a considerable extent the magnetic permeability of the investigated steels; the nitrided layers of both the investigated steels were ferromagnetic and this is due to the formation of nitrides, impoverishment in alloying elements of the austenite and austenite decomposition.
3) As a result of nitriding, the magnetic permeability of the steel EI123 increases considerably (by a factor of 3) as compared to the steel 1Kh18N9T.
4) Increase in the depth of nitriding brings about an increase of the maximum magnetic permeability; with increasing relative depth of the nitrided layer of the steel EI123 from 23 to 48.5% the maximum permeability increases by more than double. With increasing relative depth of the nitrided layer of the steel 1Kh18N9T from 50 to 93.65%, its maximum permeability increases from 3.7 to 19.8 gauss/Oe.

Card 4/5

S/129/60/000/011/004/016
E073/E535

Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

5). The results of the described investigations lead to the conclusion that it is possible to monitor the depth of the nitrided layer for a number of austenitic steels by means of an electromagnetic method. There are 1 figure, 5 tables and 5 references: all Soviet.

Card 5/5

MIKHEYEV, M.N.

Nondestructive methods of testing abroad; survey. Zav.lab. 26 no.11: 1264-1266 '60. (MIRA 13:11)

(Nondestructive testing)

85534

S/032/60/026/011/027/035
B004/B067

18 8200

AUTHORS: Mikheyev, M. N., Surin, G. V., and Tomilov, G. S.

TITLE: Differential Magnetic Device for the Quality Control of Heat Treatment

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 11, pp.1306-1308

TEXT: A device for controlling the hardening of the components of ball and roll bearings is described (Fig. 1). Э denotes the standard, X the sample, Ф the ferroprobe designed by R. I. Yanus (Ref. 2), 1,8 the magnetizing coils, 2,3 the exciter coils, 4,5 the search coils, 6,7 the short-circuiting device. The difference of the coercive forces of sample and standard is indicated by a calibrated millivoltmeter via an amplifier. The device was successfully tested at the Sverdlovskiy podshipnikovyy zavod (Sverdlovsk Ball Bearings Factory) with ГПЗ-6 (GPZ-6) ball bearings. It may be used for controlling the heat treatment of products made of steels sensitive to overheating in hardening, for which the determination of the residual amount of austenite is important. There are 2 figures and 5 Soviet references.

Card 1/2

85534

Differential Magnetic Device for the Quality Control of Heat Treatment

S/032/60/026/011/027/035
B004/B067

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR
(Institute of Metal Physics of the Academy of Sciences USSR)

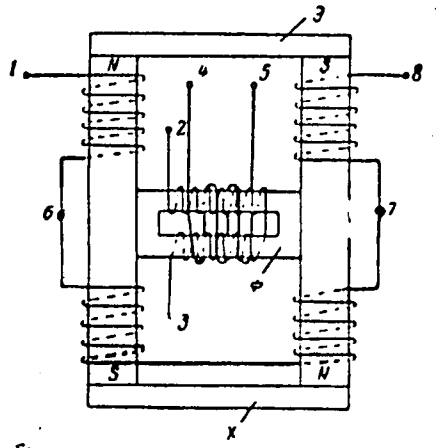

Fig.
Рис. 1

Card 2/2

S/126/62/013/004/019/022
E073/E135

18750

AUTHORS: Belenkova, M.M., Mikheyev, M.N., Pogrebetskaya, T.M., and Yurgenson, A.A.

TITLE: Magnetic properties of the steel 1Х18Н9 (1Kh18N9) after heat-treatment and nitriding

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.4, 1962, 622-625

TEXT: The authors and their team found earlier that the greater the content of elements forming stable nitrides, the more will the austenite become impoverished of alloying elements during nitriding and the more intensive will be its decomposition and the rejection of the α-phase. The influence of nitriding on the magnetic properties of steel similar to the previously tested 1Х18Н9Т (1Kh18N9T) steel but not containing titanium was studied to verify this conclusion. The compositions of the two steels studied were:
1Kh18N9: 0.14% C; 0,66% Si; 0.85% Mn; 17.68% Cr; 9.02% Ni, 0.07% Ti; 0.016% S; 0.016% P.

Card 1/ 4

1Kh18N9T: 0.1% C; 0.58% Si; 0.53% Mn; 17.78% Cr; 8.70% Ni; 0.64% Ti; 0.013% S; 0.02% P.

The magnetic properties were determined after heat-treatment (quenching from 1150 °C in water, followed by ageing for 8 hours at 800 °C). Both steels were paramagnetic in the quenched state and their susceptibility values were nearly the same. After ageing the susceptibility increased somewhat, the permeability of both steels after quenching and ageing approached unity and did not depend on the field strength. In the nitrided state the maximum permeability of the steel without Ti was considerably lower than in the steel with Ti. For a relative depth of the nitrided layer of 57.4% the steel 1Kh18N9 had a maximum permeability of 1.8 gauss/Oe, whilst for the steel 1Kh18N9T the maximum permeability was 3.7 gauss/Oe for a relative depth of the nitrided layer of 50%. The structures of the nitrided layers of both steels were identical, consisting of austenite and carbide grains in the heat-treated state; the structure of the nitrided layer was reminiscent of sorbite, due to the partial decomposition of the α-phase and the carbides during

nitride-formation. The following conclusions are arrived at: Nitriding changes considerably the magnetic properties of steels 1Kh18N9 and 1Kh18N9T; the ferromagnetic nature of the nitrided layer is due to the formation of the α-phase during nitriding. The steel 1Kh18N9T has a higher permeability in the nitrided state than the steel 1Kh18N9, and the difference is attributed to the presence of Ti in the former, which forms stable nitrides and impoverishes considerably the γ-phase of Ti, reducing its stability and bringing about rejection of α-phase. The stability of the austenitic structure after nitriding was determined by the concentration of admixtures required for forming uniform austenite and by the ability of the components entering into the austenite to form stable nitrides. The nitrided skin of austenitic steel components should have low permeability values. There are 4 tables.

Magnetic properties of the steel.. S/126/62/013/004/019/022
E073/E135

ASSOCIATION: Institut fiziki metallov AN SSSR
(Institute of Physics of Metals, AS USSR)
Ural'skiy turbomotornyy zavod
(Ural Turboengines Works)

SUBMITTED: August 26, 1961

Card 4/4

34322
S/032/62/028/003/009/017
B101/B138

18.8100

AUTHORS: Mikheyev, M. N., and Tomilov, G. S.

TITLE: Possibility of controlling the heat treatment of tool steels by their magnetic properties and electrical resistivity

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 3, 1962, 307 - 310

TEXT: The authors report on measurements of the magnetic properties and electrical resistivity of the following steels:

Steel	% C	% Cr	% Mn	% Si	
ХВ5 (KhV5)	1.42	0.951	0.23	0.25	0.25% Ni; 5.20% W
ХГ3 (KhG3)	0.90	1.35	2.43	0.50	<0.03% P; <0.02% S
9ХС (9KhS)	0.90	0.95	0.50	1.20	- 0.018% S
У10А (U10A)	0.95-1.04	<0.15	0.15-0.30	0.15-0.30	
Х12 (Kh12)	2.15	11.50	<0.35	<0.40	
Х12Ф1 (Kh12F1)	1.44	11.60	0.23	0.34	0.23% Ni; 0.86% V; 0.018% P; 0.022% S

Card 1/3

S/032/62/028/003/009/017
B101/B138

Possibility of controlling...

KhG3 steel was produced from ШХ15СГ (ShKh15SG) steel by adding 1 % Mn, at the laboratoriya pretsizionnykh splavov (Laboratory of Precision Alloys, of the authors' institute The method of measuring had been published before (Fizika metallov i metallovedeniye, 8, 2, 176 (1959); ibid., 10, 5 681 (1960); ibid., 8, 4, 543 (1959)). The data (Figs 1 - 4) are interpreted In KhG3 steel, the gradual decrease in resistivity with rising tempering temperature is evidence of the high stability of a manganous martensite. In KhV5, KhG3, and 9KhS, the coercive force first falls due to martensite disintegration, and then rises as the retained austenite disintegrates. If the latter process is completed martensite disintegration predominates (U10, KhV5), the coercive force shows a minimum at 300 - 400°C. If the retained austenite is not completely disintegrated, and martensite disintegration is delayed, coercive force is high (KhG3, 9KhS). This relationship between hardness and coercive force in martensitic steels can be used for quality control of these steels In austenitic steels (Kh12, Kh12F1), the change in coercive force is not clearly established. The quality of these steels can be controlled by measuring resistivity or intensity of magnetization There are 4 figures, 1 table, and 2 Soviet references.

Card 2/2

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Physics of Metals of the Academy of Sciences USSR)

Fig. 1 Magnetic properties, hardness, and electrical resistivity of KhV5 steel (a), and KhG3 steel (б) after hardening and tempering at various temperatures

Legend: (a) • hardening from 1200°C; o hardening from 900°C; (б) o hardening from 810°C; • hardening from 1080°C; --- after treatment at -196°C and subsequent tempering; (1) oersteds; (2) gauss; (3) ohm cm; abscissa: tempering temperature.

Fig. 2. Magnetic properties and electrical resistivity of 9KhS steel (a) and U10A steel (б) after hardening and tempering at various temperatures

Legend: (a) o hardening from 850°C; • hardening from 1000 and 1140°C; (б) o hardening from 850°C; • hardening from 1200°C; (1) oersteds; (2) gauss; (3) ohm·cm; abscissa: tempering temperature.

Card 3/8

MOROGOVA, V. M.; MIKHEYEV, M. N.

"Magnetic and Electric Properties of Steels After Various Heat-Testing Processes."

Report presented at the 4th International Conference on Nondestructive Testing, 9-13 Sep 63, London.

S/126/63/015/003/003/025
E073/E335

AUTHORS: Mikheyev, M.N., Morozova, V.M. and Pomortseva, L.B.

TITLE: Magnetic and electric properties of annealed and work-hardened steel 20

PERIODICAL: Fizika metallov i metallovedeniye, v. 15, no. 3, 1963, 343 - 346

TEXT: In order to determine those physical properties which are most suitable for assessing the degree of work-hardening by electrical methods, the coercive force, the magnetization curve for work-hardened and annealed specimens with extreme coercive-force values, the permeability and the specific electric resistance were measured on steel 20 tensile-test specimens, 14 cm long, 0.09 cm wide. The magnetization curves $B(H_e)$ as well as the permeability curves $\mu(H_e)$ of work-hardened specimens are lower than the respective values of annealed specimens. The difference between the induction ΔB of annealed and hardened specimens has a maximum at 1300 gauss in a field of H_e = 25 Oe. The coercive force H_c of work-hardened specimens is almost twice as high as that of annealed specimens. The

Card 1/2

Magnetic and electric ....

specific electric resistance is practically the same for the hardened and annealed specimens. Conclusions: coercive-force measurements are the most suitable for checking the depth of a surface-hardened layer since the coercive force of work-hardened and annealed specimens differs by as much as 100%, whilst the difference in the permeability or the magnetic induction is only 10 - 15%. There are 2 figures and 1 table.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals of the AS USSR)

SUBMITTED: June 20, 1962

Card 2/2

MIKHEYEV, M.N.; MOROZOVA, V.M.; SURIN, G.V.; BOCHENKOV, V.S.

Determination of the depth of a hardened active layer and of the quantity of residual austenite in a surface layer of rolls for cold rolling. Zav.lab. 29 no.12:1459-1461 '63. (MIRA 17:1)

1. Institut fiziki metallov AN SSSR i Ural'skiy zavod tyazhelogo mashinostroyeniya.

KUZNETSOV, I.A.; MIKHEYEV, M.N.

Magnetic and electric properties of steels in connection with electromagnetic methods of control. Fiz. met. i metalloved. 17 no.2:201-207 F '64. (MIRA 17:2)

1. Ural'skiy gosudarstvennyy universitet imeni A.M.Gor'kogo.

L 62940-65 EWP(e)/EWP(k)/EWP(z)/EWT(d)/EWT(m)/ETC(m)/EWP(b)/T/EWA(d)/EWP(l)/EWP(w)/
EWP(v)/EWP(t) WW/WJW/JD
ACCESSION NR: AR5011146 UR/0137/65/000/007/I088/I088

SOURCE: Ref. zh. Metallurgiya, Abs. 7I599

AUTHOR: Kuznetsov, I. A.; Mikheyev, M. N.

TITLE: Magnetic, electric and mechanical properties of 37KhS steel after hardening in hot alkaline media

CITED SOURCE: Sb. Fiz. magnitn. yavleniy. Sverdlovsk, 1964, 121-127

TOPIC TAGS: steel, metal heat treatment, quality control, production engineering, electromagnet, solid mechanical property, electric property, magnetic property/37KhS steel

TRANSLATION: After bright annealing and hardening with an oxide coating of 37KhS steel, a study was made of its magnetic and electric properties with a view to the development and successful application of an electromagnetic method of quality control of heat treatment of steel pieces. A coercive force meter with attached electromagnets was used to test hardened pieces made of 37KhS steel. Readings of the coercive force meter for one type of bolt are given in comparison

Card 1/2

L 62940-65

ACCESSION NR: AR5019146

to H_B. The determined limits for the readings of the coercive force meter corresponding to the standard H_B for the pieces were: 72-98 microamperes for an impression diameter of 3.0-3.4 mm. Long term use of the coercive force meter has confirmed the advantage of magnetic control before mechanical tests.

V. Olenicheva

SUB CODE: MM ENCL: 00

Card 2/2

ACC NR: AR6027503 SOURCE CODE: UR/0137/66/000/004/I019/I019

AUTHOR: Belenkova, M. M.; Mikheyev, M. N.; Malyshev, K. A.; Sadovskiy, V. D.; Ustyugov, P. A.

TITLE: Phase transformations during the deformation and tempering of austenitic steel

SOURCE: Ref. zh. Metallurgiya, Abs. 4I127

REF SOURCE: [Tr.] In-ta fiz. metallov. AN SSSR, vyp. 24, 1965, 54-58

TOPIC TAGS: metal deformation, austenite steel, martensitic transformation, grain size, magnetic susceptibility

TRANSLATION: A study was made of the magnetic, electrical and mechanical properties of 60Kh18N8V austenitic band steel subjected to deformations of 10, 25, 31, and 43% after quenching from 1050°C. For the same deformation conditions, a fuller decomposition of austenite occurred in large-grained samples as a result of the variation of the position of the martensitic point for a change of grain size (the point of the initial martensitic transformation of large-grained samples was located higher than fine-grained). Under the effect of deformation in the steel, a much greater amount of α-phase formed than during tempering. A definite correlation was found between the nature of the magnetic and electrical property changes on the one hand and the mechanical properties on the other, as a function of tempering temperature. Thus, a drop in σ_b

UDC: 669.15'26'74'24.781.017.3:621.785.78

Card 1/2

ACC NR: AR6027503

and σ_s of samples deformed at 20°C was found beginning at 400-450°C; at these same temperatures the lowering of electrical resistivity was initiated. Magnetic susceptibility increased after 500°C, while ψ and a_k decreased. It was concluded that the changes in mechanical properties were caused by processes associated with the formation of α-phase during cold deformation. During tempering of the deformed samples, the α-phase of the original deformation is dissolved and some quantities of the ferromagnetic phase appear in separate portions owing to carbide formation. I. Tulupova.

SUB CODE: 11,13

Card 2/2

SOURCE CODE: UR/0196/66/000/005/B002/B002

AUTHOR: Kuznetsov, I. A.; Mikheyev, M. N.

TITLE: Effect of carbide formation on magnetic characteristics of carbon steel

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 5B7

REF SOURCE: /Tr./ In-ta fiz. metallov. AN SSSR, vyp. 24, 1965, 36-46

TOPIC TAGS: carbon steel, magnetic property, carbide phase

ABSTRACT: Variations were studied of the saturation intensity I_s and the coercive force H_c of 05, 60, U12, and 60S2 steels after hardening at 900--950C in water and subsequent cooling down to -195C and also after tempering at 100--600C for a time from 10 min to 4 hours. The variations of I_s with temperature corroborates the hypothesis that low-temperature-tempering Fe_xC-type carbides ($x < 3$) are distinct from the cementite Fe_3C. In tempering the carbon steels, three carbide phases are formed: ε Fe_xC, χ Fe_cC, and Fe_3C having Curie points of 380, 265, and 210C, respectively. Both H_c and I_s are sensitive indicants of carbide appearance in tempering. When the carbides were passing through the Curie point, a maximum of H_c was observed which again testifies to the fact that three distinct carbide phases occur during steel tempering. Nine figures. Bibliography of 53 titles. V. Olenicheva.
[Translation of abstract]

SUB CODE: 11

UDC: 621.318.122

Card 1/1

VDOVIN, Yu.A.; VLASOV, V.V.; ZATSEPIN, N.N.; KOROBEYNIKOVA, I.Ye.; MIKHEYEV, M.N.; RODIGIN, N.M.; TOMILOV, G.S.; SHTURKIN, D.A.; YANUS, R.I.

Discussion on nondestructive testing methods. Defektoskopiia no.1:90 '65. (MIRA 18:6)

L 62940-65 EWP(e)/EWP(k)/EWP(z)/EWT(d)/EWT(m)/SEC(m)/EWP(b)/T/EWA(d)/EWP(l)/EWP(w)/EWP(v)/EWP(t) WW/MJW/JD

ACCESSION NR: AR5019146 UR/0137/65/000/007/I088/I088

SOURCE: Ref. zh. Metallurgiya, Abs. 7I599

AUTHOR: Kuznetsov, I. A.; Mikheyev, M. N.

TITLE: Magnetic, electric and mechanical properties of 37KhS steel after hardening in hot alkaline media

CITED SOURCE: Sb. Fiz. magnitn. yavleniy. Sverdlovsk, 1964, 121-127

TOPIC TAGS: steel, metal heat treatment, quality control, production engineering, electromagnet, solid mechanical property, electric property, magnetic property, 37KhS steel

TRANSLATION: After bright annealing and hardening with an oxide coating of 37KhS steel, a study was made of its magnetic and electric properties with a view to the development and successful application of an electromagnetic method of quality control of heat treatment of steel pieces. A coercive force meter with attached electromagnets was used to test hardened pieces made of 37KhS steel. Readings of the coercive force meter for one type of bolt are given in comparison

Card 1/2

L 62940-65

ACCESSION NR: AR5018146

to H_B. The determined limits for the readings of the coercive force meter corresponding to the standard H_B for the pieces were: 72-98 microamperes for an impression diameter of 3.0-3.4 mm. Long term use of the coercive force meter has confirmed the advantage of magnetic control before mechanical tests.

V. Olenicheva

SUB CODE: MM ENCL: 00

Card 2/2

L 33305-65 EPA/EWT(l)/EPA(s)-2/EWT(m)/EPF(c)/EPF(n)-2/EPR Paa-4/Pr-4/Ps-4/
Pt-10/Pu-4 WW/JW/JWD/GS

ACCESSION NR: AT5004082 S/0000/62/000/000/0019/0025

57
AUTHOR: Abrukov, S. A. (Candidate of technical sciences); Mikheyev, M. P. B+1

TITLE: Use of the IAB-451 instrument for studying vibration propagation of a flame in a tube

SOURCE: Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po probleme vibratsionnogo i pul'satsionnogo goreniya. 1st, 1961. Trudy. Moscow, Sektor nauchno-tekhn. inform. GIAP, 1962, 19-25

TOPIC TAGS: flame propagation, combustion process, schlieren interference, combustion analysis

ABSTRACT: Optical research methods (the shadow method, schlieren method or Töpler method, interference method) are currently being widely used for studies in shock tubes. In view of their high sensitivity to local temperature changes, they are also being used for studying heat phenomena, particularly combustion processes. This article is devoted to the use of one of the modifications of the Töpler method, the method of schlieren-interference in polarized light, for studying some of the peculiarities in vibration propagation of a flame in semiopen tubes for air-mixtures of carbon monoxide. A modified IAB-451 Töpler instrument was used in the research.

Card 1/2

L 33305-65

ACCESSION NR: AT5004082

High speed motion pictures of the flame propagation were made using an SKS-IM camera. A reaction tube with a rectangular cross section (13 × 29 mm^2) 630 mm long was placed horizontally in the path of the parallel light beams between the collimator and observation tubes of the IAB-451 instrument. An opening 73 mm long was cut in the narrow side of the tube and covered with plane-parallel plates made of optical glass. The distance from the closed end to the opening in the side was 330 mm. An examination of the films obtained and a study of the individual frames show that the area of the combustion zone undergoes a change in the period of a single oscillation, these changes being completely measurable and repeated periodically in time with the oscillations of the flame. This phenomenon is explained by the periodic change in the direction and velocity of the motion of particles in the standing sound wave. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 29Dec62 ENCL: 00 SUB CODE: FP, OP

NO REF SOV: 003 OTHER: 001

Card 2/2

ACCESSION NR: AR4019268 S/0196/64/000/001/T008/T009

SOURCE: RZh. Elektrotekhnika i energetika, Abs. 1T84

AUTHOR: Abrukov, S. A.; Mikheyev, M. P.

TITLE: Use of the IAB-451 apparatus for studying vibration propagation of a flame in a tube

CITED SOURCE: Tr. 1-y Vses. nauchno-tekhn. konferentsii po probl. vibratsion. i pul'satsion. goreniya. M., 1962, 19-25

TOPIC TAGS: flame tube, flame, flame vibration, vibration propagation, vibration burning, flame vibration propagation

TRANSLATION: A report on the use of one of the modifications of Tepler's method -- the method of Schlieren-interference in polarized light -- for studying some of the properties of vibration burning in semi open tubes for air mixtures of CO. A description is given of an installation designed at the Department of Molecular Physics of the Kazan State University. Experiments are conducted in a reaction tube with a cross section of 13 X 29 X 630 mm. It is observed that the surface area of the flame changes in a period of one oscillation. It is confirmed that these changes

Card 1/2

ACCESSION NR: AR4019268

are caused by periodic changes in the direction and velocity of motion of particles in the standing sound wave. Nonhomogeneities are observed in the distribution of temperature of the products of combustion along the cross section of the reaction tube which oscillate in correspondence with the oscillations of the gas column. The arising of these temperature nonhomogeneities is apparently connected with convective cooling of the products of combustion. Ill., 2, bibl. 4 titles.
R. Dulatov

DATE ACQ: 25Feb64 SUB CODE: PH ENCL: 00

Card 2/2

ABRUKOV, S. A.; MIKHEYEV, M. P.

Application of the interference method of bands in polarized light using a IAB-451 instrument. Izv. vys. ucheb. zav.; fiz. no.6:115-120 '62. (MIRA 16:1)

1. Kazanskiy gosudarstvennyy universitet imeni V. I. Ul'yanova-Lenina.

(Interferometer)

VOROB'YEV, S.A., kand.tekhn.nauk, otv.red.; KONOVALOV, A.I., inzh., red.; MAKARENKO, V.P., inzh., red.; MIKHEYEV, M.V., inzh., red.; NOVIKOVA, N.T., inzh., red.; PIKHTOVNIKOV, R.V., prof., red.; PODLOZHENOV, P.M., inzh., red.; SENKO, M.F., prof., red.; TOROPOV, A.I., inzh., red.; TSERKOVNYY, I.M., inzh., red.; CHERKASHIN, I.P., inzh., red.; SHEVCHENKO, M.G., tekhn.red.; LIMANOVA, M.I., tekhn.red.

[Mechanization and automation of production processes; proceedings of the city technical conference] Mekhanizatsiia i avtomatizatsiia proizvodstvennykh protsessov; sbornik materialov gorodskoi tekhnicheskoi konferentsii. Khar'kov, Khar'kovskoe knizhnoe izd-vo, 1959. 295 p. (MIRA 13:1)

1. Kommunisticheskaya partiya Ukrainy. Khar'kovskiy gorodskoy komitet. 2. Nachal'nik Ukrainskoy proyektno-konstruktorskoy kontory "Prommekhanizatsiya" (for TSerkovnyy).
(Automation) (Technological innovations)

GRYAZEV, M. (g. Stalingrad); SVETLOPOLYANSKIY, V. (g. Stalingrad); MIKHEYEV, N. (g. Stalingrad)

Pneumatic track lifter. Zhil.-kom.khoz. 10 no.9:26-27 '60. (MIRA 13:9)

(Street railways--Track)

MIKHEYEV, N., mayor tekhnicheskoy sluzhby

Faultless work of equipment. Av. i kosm. 48 no.11:21-22 N '65.
(MIRA 18:10)

NIKANOROVA, A.I., kand.tekhn.nauk, starshiy nauchnyy sotrudnik; MIKHEYEV, N.A., inzh.

Preservation of poles by use of a method which involves long-term soaking. Vest.sviazi 20 no.3:7-8 Mr '60. (MIRA 13:6)

1. TSentral'nyy nauchno-issledovatel'skiy institut svyazi (for Nikanorova). 2. Nachal'nik Upravleniya tekhnicheskoy ekspluatatsii Ministerstva svyazi Latviyskoy SSR (for Mikheyev).
(Electric lines--Poles) (Wood--Preservation)

MIKHEYEV, N.A.; GRIBOVOD, A.F.

Case of abnormal divergence of the left coronary artery from the pulmonary artery. Sud.-med. ekspert. 4 no.3:56-57 Jl-S '61.
(MIRA 14:10)

1. Kafedra sudebnoy meditsiny (nachal'nik - prof. I.F. Ogarkov) i kafedra patologicheskoy anatomii (nach. - prof. A.N.Chistovich) Voyenno-meditsinskoy ordena Lenina akademii imeni S.M.Kirova.
(CORONARY VESSELS--ABNORMITIES AND DEFORMITIES)

MIKHEYEV, N., dotsent, kand. med. nauk

For children ... Voen. znan. 42 no.[illegible]:26-27 F '66.

(MIRA [illegible])

AUTHOR MIKHEYEV, N.B.

TITLE The Study of the Diffusion of Iron into Oxides by Means of the Method of Marked Atoms.
(Izucheniye diffuzii zheleza v okisly metodom mechenykh atomov.
-Russian)

PERIODICAL Atomnaya Energiya, 1957, Vol 2, Nr 6, pp 568-569 (U.S.S.R.)

ABSTRACT In the Laboratory for the structure of the surface layers of the Institute for Physical Chemistry of the Academy of Science of the U.S.S.R., Professor K.M.GORBUNOV and IZBEKOV V I. used radioactive isotopes for the purpose of studying the diffusion of metals in oxides. The method of the radioactive indicators is by far more easy than the optical, microchemical, etc. methods formerly used. The above mentioned professors determined the diffusion coefficients of Fe^{59} iron by means of the absorption method and by means of taking off the layers. By applying the absorption method the diffusion constants can be computed from the decrease of the β-activity of the sample (which depends upon the diffusion of the iron into the oxide), in which case the samples are not destroyed by the investigation. The second method is based upon the determination of the modification of the activity of the sample as a function of the depth of the taken-off layer. From the measuring results the curve for the distribution of the oxide diffused into the metal was then determined. The samples were produced by pressing powders of aluminum oxide, iron oxide and titanium oxide in-

Card 1/2

The Study of the Diffusion of Iron into Oxides by Means [illegible]

to tablets. These tablets were then annealed at temperatur[illegible] from 1100 to 1400°C. The absorption coefficient μ was exper[illegible]tally determined from the initial part of the curve of the ß-radiation of the Fe^{59} in aluminum.
Further investigations in this direction and especially the explanation of the influence exercised by the admixtures in the oxides upon the diffusion velocity of the metal makes it possible to explain the mechanism of the effect of the increase of heat stability on alloyed admixtures.
(1 illustration).

ASSOCIATION Not Given.
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Card 2/2

MIKHEYEV, N.B.

14

Application of the radiometric method of analysis to the study of the composition of phosphotungstates. V. I. Spitsyn and N. B. Mikheev. *Zhur. Neorg. Khim.* 2, 1107–70(1957).—A radiometric method was described for detg. the compn. of phosphotungstates by detg. the P:W ratio. The compds. are prepd. to include 2 radioactive elements which differ in their half-lives. By measuring the decrease in the radioactivity for each of the elements it was possible to det. the P:W ratio for sodium phosphotungstate. This method gives more precise results than does chem. analysis. J. Rovtar Leach

AUTHOR: SPITZYN, VIKT. I., MIKHEYEV, N.B. 89-9-12/32

TITLE: The Analytical Determination of Radio-Cesium in Form of a Tungstate-Phosphor. (Analiticheskoye opredeleniye radiotseziya v vide fosfornovol'framata)

PERIODICAL: Atomnaya Energiya, 1957, Vol 3, Nr 9, pp 255-256 (U.S.S.R.)

ABSTRACT: For the analytical determination of radio cesium the following is used:

1.) A solution of C_sCl 7gl

2.) A solution of 5,5 g $Na_3 H_4 \left[P(W_2O_7)_6\right].19.H_2O$ in 100 ml 5% HNO_3

3.) 15% NaOH

4.) 15% KOH

5.) 0,1% solution of $Fe(NO_3)_3$

By means of these chemicals the process of analyzation, which is described in detail, is carried out.

Card 1/2

The Analytical Determination of Radio-Cesium in Form of a Tungstate-Phosphor.

89-9-12/32

The presence of Na-salts, rare earths, Mg, Al and K (less than 10 g/l) as well as of the salts of various acids exercises no influence on the development of the analysis.

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED: 30.4.1957
AVAILABLE: Library of Congress

Card 2/2

AUTHOR: Mikheyev, N. B. 81-2-23/55

TITLE: The Application of Radiometric Analysis in Chemical Investigations (Primeneniye radiometricheskogo analiza v khimicheskikh issledovaniyakh).

PERIODICAL: Atomnaya Energiya, 1958, Nr 2, pp 21-27 (USSR)

ABSTRACT: The fundamental idea of the method is as follows: The compound to be investigated is produced of the basic substances which contain radioactive isotopes with a different half-life. At first the specific activity of the initial substances is determined and then the activity of the compound. After the decay of a large portion of the short-lived substance the activity is again determined. On the basis of these measurements it is possible to determine the initial activity of the isotopes in the compound by solving the system of equations:

$$I_1 + I_2 = I_{1+2}$$

$$k_1 I_1 + k_2 I_2 = I_{1+2}$$

As I_1 and I_2 are known of this point the proportion by weight or the atomic ratio of the elements in the compound can be cal-

Card 1/2

The Application of Radiometric Analysis in Chemical Investigations 89-10-2/35

culated. The P : W- ratio of sodium-phos hotungstate was deter-
mined with the aid of P^{32} and W^{187}. The radiometric analysis
is by ± 2,5% more accurate than the chemical analysis.

AVAILABLE: Library of Congress

Card 2/2 1. Isotopes(Radioactive)-Applications 2. Sodium-phosphotungstate-Radiometric analysis

AUTHORS: Mikheyev, N. B., Spitsyn, Vikt. I. SOV/78-3-10-16/35

TITLE: Investigation of the Properties of Salt-Forming Ions of Hydrogen in Phosphotungstic Acid (Izucheniye svoystv soleobrazuyushchikh ionov vodoroda fosfornovol'framovoy kisloty)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 10, pp 2320-2322 (USSR)

ABSTRACT: The presence of hydroxonium ions in phosphotungstic acid was investigated by the method of isomorphous exchange by means of radioactive indicators. Since the potassium ion has nearly the same ion radius as the hydroxonium ion, it was used as hydroxonium exchange-ion H_3O^+ has a ion radius of 1,33 Å, whereas K^+ has one of 1,35 Å. An analysis was carried out of the action exercised by the concentration of nitric acid and hydrochloric acid on the potassium content of the precipitate of phosphotungstic acid. It follows from radiometric analyses that in the range analyzed an uninterrupted series of solid solutions is formed by phosphotungstic acid and potassium phosphorus tungstate. The results obtained show that phosphotungstic acid must be regarded as a hydroxonium compound with the following formula:

Card 1/2

SOV/78-3-10-16/35

Investigation of the Properties of Salt-Forming Ions of Hydrogen in Phosphotungstic Acid

$(H_3O)_3\left[PW_{12}O_{40}\right] \cdot 26\ H_2O$. In this compound the salt-forming hydrogen ions were exchanged by hydroxonium ions.
There are 1 figure, 2 tables, and 16 references, 5 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physicochemistry of the Academy of Sciences, USSR)

SUBMITTED: July 17, 1957

Card 2/2

AUTHOR: Mikheyev, N.B.

TITLE: Solubility Determination of Poorly Soluble Compounds by Means of Foreign Radioactive Tracers (Opredeleniye rastvorimosti trudnorastvorimykh soyedineniy s pomoshch'yu metodov radioaktivnykh indikatorov)

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 4, pp. 354-358 (USSR)

ABSTRACT: The rule governing the transition of a microelement - actually isomorphous with the compounds of the macroelement - in a solution are determined, in which partial dissolution of the solid phase containing the microelement occurs. A method was worked out for the determination of the solubility of compounds which are difficult to dissolve. The influence exercised by the degree of equilibrium between all precipitations and the saturated solutions upon the character of the curves used when determining solubility was explained. On the basis of two cases in which solubility was experimentally determined the applicability of the method is proved.
The solubility of Ba_2SO_4 with Sr^{90} and of K_2PtCl_6 with Cs^{134} is

Card 1/2

Solubility Determination of Poorly Soluble Compounds by Means of Foreign Radioactive Tracers

investigated. For K_2PtCl_6 the solubility of this salt in 0,1 and 0,2N KCl-solutions amounts to 110 and 33 mg per 100 ml solution respectively at 28°C. There are 3 figures, and 8 references, 3 of which are Soviet.

SUBMITTED: May 4, 1957

1. Intermetallic compounds--Solubility 2. Intermetallic compounds --Test methods 3. Radioisotopes--Applications

Card 2/2

SOV/120-59-4-48/50

AUTHORS: Mikheyev, N. B. and Glazkov, V. A.

TITLE: A Laboratory Cryostat

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 4, p 158 (USSR)

ABSTRACT: Soviet cryostats are usually rather bulky and may not be always easily available. The present note describes construction of a cryostat for temperatures down to -40°C which can be easily prepared in a laboratory possessing a Heppler ultrathermostat or TS-15. Fig 1 shows schematically the working principle of the cryostat. The ultrathermostat should be fitted with a contact thermometer for low temperatures, and it is connected to a coil of an electromagnetic valve, instead of to a heater. At temperatures higher than the required (set) temperature, the valve is open and the liquid (acetone) circulates freely between the thermostat and a refrigerator. The liquid is kept in motion by a centrifugal pump of the ultrathermostat. When the required temperature is reached the contact thermomter circuit is broken and the electromagnetic valve is closed by means of a relay;

Card 1/3

A Laboratory Cryostat

this stops the circulation of the liquid. When the liquid warms up in the thermostat the electromagnetic valve opens and the whole cycle is repeated. A cylindrical vessel with double walls is used as a refrigerator. This cylinder is made of galvanized iron and its dimensions are: 200 mm external diameter, 150 mm internal diameter, and 250 mm height. To insulate the cylinder thermally it was placed in a wooden box filled with sawdust. The cylinder was filled with acetone cooled with dry ice. The electromagnetic valve (Fig 2) is made of molybdenum glass. The inner (moving) part of the valve is a glass cylinder whose lower conical end fits the outer part of the valve. The interior of this glass cylinder is filled with annealed iron wire impregnated with BF-2 glue solution. When a current passes through the electromagnet coil outside the valve, the iron-filled cylinder is pushed down and this stops the flow of acetone. The electromagnet coil is designed to take 220 V, which is the working voltage of the ultrathermostat. Experimental tests of the cryostat showed that it works down to $-30^{\circ}C$, holding the temperature constant to within $\pm 0.05^{\circ}C$. To accelerate cooling, dry ice may be placed both in the refrigerator and in the cooling liquid of the thermostat. To cool the cryostat

A Laboratory Cryostat

from +20°C to -15°C requires 30-40 min. The amount of dry ice required, including the initial cooling of the liquid, is 10-12 kg for six hours' work in the region of -10 to -15°C. Note: This is a slightly abridged translation. There are 2 figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Physical Chemistry Institute, Academy of Sciences, USSR)

SUBMITTED: July 15, 1958.

Card 3/3

MIKHEYEV, N.B.

Effective method of establishing equilibrium between the crystalline phase and the solution. Zhur.neorg.khim. 5 no.5:1146-1148 My '60. (MIRA 13:7)

1. Institut fizicheskoy khimii Akademii nauk SSSR.
(Phase rule and equilibrium) (Crystals)

MIKHEYEVA, L.M.; MIKHEYEV, N.B.; PCHELINTSEVA, G.M., red.; TARAKANOVA, A.A., red.; VLASOVA, N.A., tekhn. red.

[Radioactive isotopes in analytical chemistry] Radioaktivnye izotopy v analiticheskoi khimii. Moskva, Gos.izd-vo lit-ry v oblasti atomnoi nauki i tekhn., 1961. 98 p. (MIRA 15:1)
(Radioisotopes) (Chemistry, Analytical)

MIKHEYEV, N.B.; MIKHEYEVA, L.M.

Effect of complex formation on the separation of elements by cocrystallization. Dokl. AN SSSR 141 no.5:1109-1112 D '61. (MIRA 14:12)

1. Institut fizicheskoy khimii AN SSSR. Predstavleno akademikom V.I. Spitsynym.
(Complex compounds) (Crystallization)

MIKHEYEV, N.B.; MIKHEYEVA, L.M.

Effect of complex formation on the cocrystallization coefficient. Zhur.neorg.khim. 7 no.3:671-675 Mr '62. (MIRA 15:3)
(Complex compounds) (Crystallization)

MIKHEYEV, N.B.; MIKHEYEVA, L.M.; MALININ, A.B.; NIKONOV, M.D.

Effect of complex formation on the separation of elements during cocrystallization proceeding in accordance with the logarithnic law. Zhur.neorg.khim. 7 no.9:2267-2270 S '62. (MIRA 15:9)

(Complex compounds) (Crystallization)

S/186/63/005/001/001/013
E075/E436

AUTHORS: Mikheyev, N.B., Pettsol'd, V.

TITLE: Distribution of radioactive cesium between the crystalline phase of potassium aluminium alums and solution

PERIODICAL: Radiokhimiya, v.5, no.1, 1963, 22-28

TEXT: As there are no literature data on the cocrystallization coefficient of Ce with alums, the authors attempted to determine it using three different methods. Khlopin's method of isothermal removal of supersaturation was unsatisfactory. This was due to the fact that thermodynamic equilibrium was not reached in the system $(K, Cs)Al(SO_4)_2 \cdot 12H_2O$ - solution and the coefficient (D) did not reach a constant value during recrystallization of the solid phase. Grebenshchikova and Bryzgalova's method of partial recrystallization of the solid phase also failed to give constant values of D due to interference from the recrystallization of the solid phase. V.G.Khlopin and M.S.Merkulova's method (ZhFKh, v.13, 1939, 1282) was used successfully. In this method the fully recrystallized solid phase of the macrocomponent

(alum) comes into contact with a saturated solution containing the microelement (Ce) isomorphous with the solid phase. Radioactive Ce is adsorbed on the surfaces of alum crystals and its distribution between the surfaces and the solution is given by Khlopin's law

$$\frac{x}{a - x} = D_1 \frac{y_1}{c}$$

where x - the quantity of microcomponent adsorbed by the solid phase, (a - x) - its content in the solution, y_1 - the quantity of macrocomponent on the surface of the solid phase taking part in the adsorption of the microcomponent, c - the quantity of microcomponent in the solution, D_1 - cocrystallization coefficient of microcomponent with the surface layer of the solid phase. Khlopin and Merkulova showed that D_1 is numerically the bulk coefficient of cocrystallization. The establishment of the absorptional equilibrium took from 16 to 20 hours. After this time a constant value of D was obtained equal to about 20. The method of logarithmic cocrystallization was used to evaluate D.

Distribution of radioactive ...

The maximum value obtained in this way was 19 ± 1 which is in good agreement with the values from the adsorptional experiments. There are 5 tables.

SUBMITTED: November 6, 1961

Card 3/3

MIKHEYEV, N.B.; SHMANENKOVA, G.I.

Cocrystallization of ionic compounds from organic solvents.
Dokl. AN SSSR 153 no.3:601-604 N '63. (MIRA 17:1)

1. Institut biofiziki Ministerstva zdravookhraneniya SSSR.
Predstavleno akademikom V.I. Spitsynym.

MIKHEYEV, N.B.; FRITSYN, Vik'. I.; KHERMANN, A.

Obtaining an equilibrium between the crystalline phase and solution by means of the electrochemical method. Vest. Mosk. un. Ser. 2: Khim. 19 no.6:29-31 N-D '64. (MIRA 18:3)

1. Kafedra neorganicheskoy khimii Moskovskogo universiteta.

L 19606-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/SSD/AS(mp)-2/AFMDC/AFWL/AFETR/ESD(t) JD/JG

ACCESSION NR: AP5003151 S/0020/64/158/002/0440/0441

AUTHOR: Mikheyev, N. B.; Mikheyeva, L. M.;

TITLE: Mechanism of coprecipitation of microquantities of yttrium with hydroxides of polyvalent metals

SOURCE: AN SSSR. Doklady, v. 158, no. 2, 1964, 440-441

TOPIC TAGS: yttrium, iron, zirconium isotope, electrostatics, ion exchange, adsorption, alkali, chemical separation, radioactive source

ABSTRACT: The mechanism of the coprecipitation of microquantities of radioactive isotopes with hydroxides of polyvalent metals depends both on the properties of the hydroxides and on the state of the microelement in solution. The authors proceed from the hypothesis that in the region of acidity of the medium when yttrium exists in the ionic state, its coprecipitation with hydrozides of polyvalent metals [e.g. $Fe(OH)_3$, $Zr(OH)_4$] should occur on account of electrostatic physical adsorption. The coprecipitation of Y^{90} without a carrier with $Fe(OH)_3$ and $Zr(OH)_4$ as a function of the

Card 1/2

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ACCESSION NR: AP5003151

acidity of the medium was found to obey the proposed equation, thus indicating that the coprecipitation is a result of electrostatic ion-exchange adsorption. In the presence of lower acidity, adsorption proceeds chiefly in the external cloud of the electric double layer, while in the presence of greater acidity it proceeds in the potential-determining layer of the precipitate. Orig. art. has 1 formula, 1 graph.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 14Apr64 ENCL: 00 SUB CODE: GC, NP

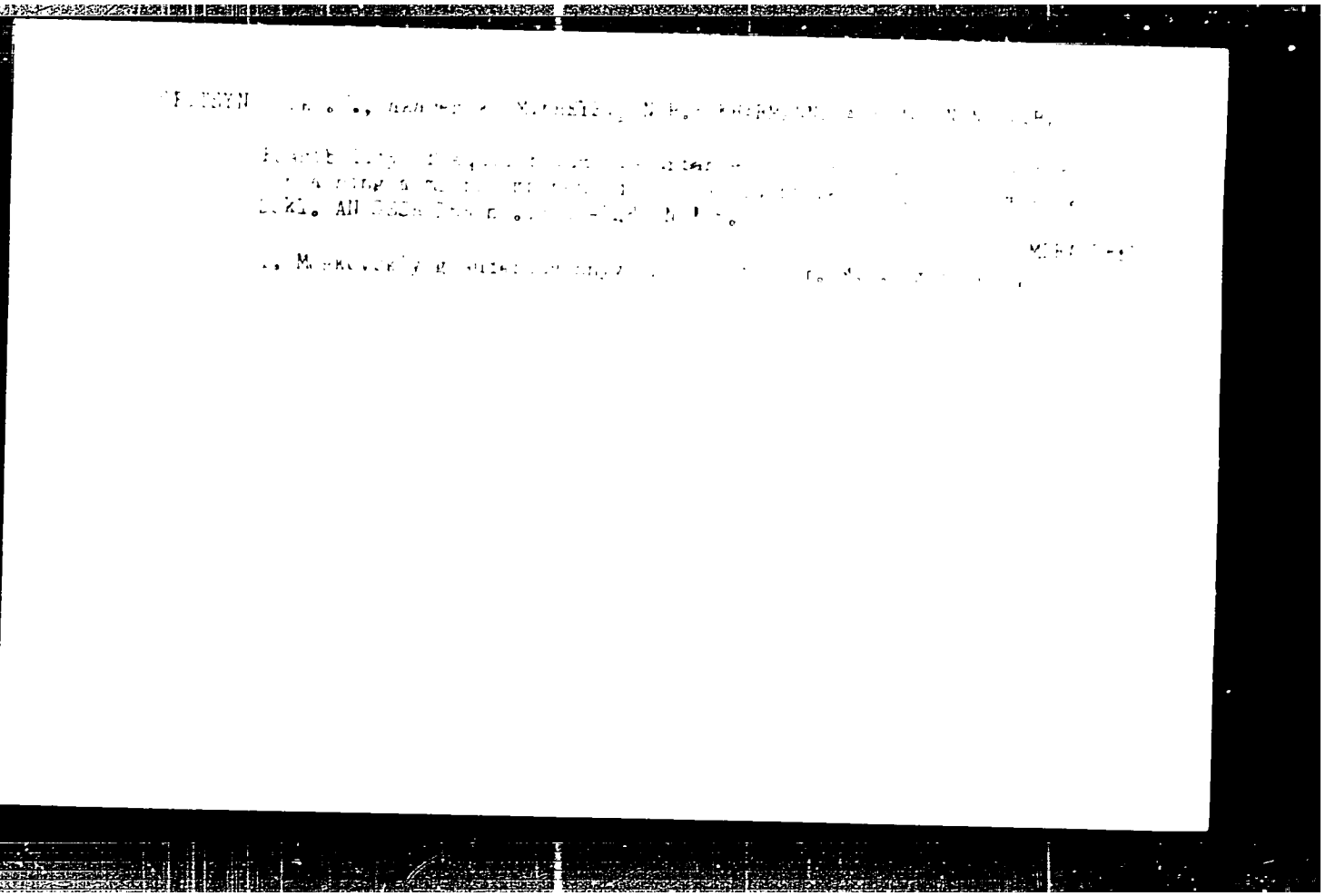
NO REF SOV: 006 OTHER: 000 JPRS

Card 2/2

MIKHEYEV, N.B.; SHMANENKOVA, G.I.

Thermodynamic study of the cocrystallization of potassium and rubidium chlorides from organic solvents. Zhur. neorg. khim. 10 no.1:244-250 Ja '65. (MIRA 18:11)

1. Submitted Aug. 16, 1963.



L 16944-66 EWT(m)/EWP(t) LJP(c) JD/JW

ACC NR: AP6004392 (A) SOURCE CODE: UR/0020/66/166/003/0658/0659

AUTHOR: Spitsyn, V.I. (Academician); Mikheyev, N.B.; Khermann, A.

ORG: Moscow State University im. M.V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Thermodynamic study of the distribution of microquantities of strontium between barium hydrophosphate and the solution

SOURCE: AN SSSR. Doklady, v. 166, no. 3, 1966, 658-659

TOPIC TAGS: strontium compound, barium compound, phosphate, thermodynamic calculation

ABSTRACT: A thermodynamic study of the cocrystallization of strontium with barium hydrophosphate was carried out. An electrolytic method was employed to establish equilibrium in the $BaHPO_4$-$SrHPO_4$-H_2O system: under the influence of electrolysis, multiple recrystallization of the deposit is achieved which promotes the equilibrium. The cocrystallization factor D was determined by using radioactive strontium, and found to be constant (0.31) at low ionic strengths of the solution. The activity products of $BaHPO_4$ and $SrHPO_4$ were determined by use of P^{32}, and found to be 3.96×10^{-8} and

Card 1/2 UDC: 541.123.4

L 16944-66
ACC NR: AP6004392

and 1.12×10^{-7}, respectively. From these values, the energy of formation of a solid solution of $SrHPO_4$ in $BaHPO_4$ was calculated to be +31.6 cal/mole. Orig. art. has: 1 figure, 1 table, and 1 formula.

SUB CODE: 07 / SUBM DATE: 16Jun65 / ORIG REF: 006 / OTH REF: 004

20/

Card 2/2 vmb

MIKHEYEV, M.G.

Passage of FM oscillations through an oscillatory circuit at small indices of modulation. Radiotekhnika [illegible]
N '64.

1. Leningradskiy ordena Lenina politekhnicheskiy institut imeni M.I. Kalinina.

L 20720-65 EEO-2/EWT(d)/EWT(l)/EEC-4/EED-2/EWA(h) Pm-4/Pn-4/Pac-4/Peb/Pl-4
ACCESSION NR: AP5001372 AEDC(b)/RAEM(l)/S/0106/64/000/012/0042/0050 AFTC(b)

AUTHOR: Mikheyev, N. G.; Pirogov, A. A.

TITLE: Method of suppressing spurious phase modulation [Report at the Moscow City Board of NTORiE, 29 Oct 63]

SOURCE: Elektrosvyaz', no. 12, 1964, 42-50

TOPIC TAGS: noise suppression, spurious phase modulation

ABSTRACT: A new "phase limiter," in a sense analogous to the amplitude limiter, which is applicable to various synchronous master-oscillator devices is suggested. By linear combination of two waves — one of them subject to filtration and the other derived from the system output — the waves distorted by phase modulation (PM) are converted into waves with undesirable AM; the latter is suppressed by an amplitude limiter, and the wave is subsequently filtrated in the oscillatory circuit of a regenerative-type tuned amplifier. A functional

Card 1/2

L 20720-65
ACCESSION NR: AP5001372

diagram and the principal theory of the PM-suppressor are presented. Experiments carried out with a one-stage laboratory hookup at 100 kc corroborated the efficiency of PM suppression; a two-stage device yielded still better results. Orig. art. has: 11 figures and 12 formulas.

ASSOCIATION: none

SUBMITTED: 11Jun64 ENCL: 00

SUB CODE: EC NO REF SOV: 004 OTHER: 000

Card 2/2